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Title:

Gauge without gauge: From physical to emergent gauge symmetries

Speaker:

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Abstract:

Gauge symmetries indicate redundancies in the description of the relevant degrees of freedom of a given field theory and restrict the nature of observable quantities. One of the problems faced by emergent theories of relativistic fields is to understand how gauge symmetries can show up in systems that contain no trace of these symmetries at a more fundamental level. We argue how the trivialization, due to the decoupling and lack of excitation of some degrees of freedom, of the Noether currents associated with physical symmetries leads to emergent gauge symmetries in specific situations. An example of a relativistic theory of a (Abelian) vector field is worked out in detail in order to make explicit how this mechanism works and to clarify the physics behind it. The interplay of these ideas with well-known results of importance to the emergent gravity program, such as the Weinberg-Witten theorem, are discussed.